I claim:

1. A method for producing cardiomyocytes capable of proliferation, comprising:

(a) providing cardiomyocyte cells;

(b) providing myoblast cells; and

(c) mixing the cells of step (a) with the cells of step (b) under *in vitro* or *in vivo* conditions that allow cell fusion of cardiomyocyte cells with myoblast cells to form heterokaryotic cardiomyocytes.

2. A method as described in claim 1, further comprising a selection step wherein cells are selected based on their abilities to proliferate.

3. Heterokaryotic cardiomyocytes produced by the process described in claim 1.

4. A method as described in claim 1, wherein the selection step comprises the detection of mitosis.

5. A method as described in claim 1, wherein step (c) comprises the addition of chondroitin sulfate.

6. A method as described in claim 5, wherein the chondroitin sulfate is added to a final concentration of between 5 micromolar to 5 millimolar.

7. Heterokaryotic cardiomyocytes produced by the process described in claim 1.

8. A method of producing human heterokaryons exhibiting the characteristics of both myoblasts and cardiomyocytes, comprising:

(a) culturing human myoblast cells from one or more human biopsies;

(b) providing cardiomyocyte cells; and

(c) incubating the cells from step (a) with the cells of step (b) under conditions that allow fusion of human myoblasts with cardiomyocytes.

9. A method as described in claim 8, wherein step (a) is carried out by culturing the human myoblasts through at least one mitosis.

10. A method as described in claim 9, further comprising a selection step wherein one or more clones are selected based on the abilities of the heterokaryons to proliferate.

11. A method as described in claim 9, wherein the selection step comprises detection of mitosis.

12. Heterokaryotic cardiomyocytes produced by the process described in claim 8.

13. A method as described in claim 8, wherein step (c) comprises the addition of chondroitin sulfate.

14. A method as described in claim 13, wherein the chondroitin sulfate is added to a final concentration of between 5 micromolar to 5 millimolar.

15. Heterokaryotic cardiomyocytes produced by the process described in claim 12.

16. A method of replenishing degenerated and degenerating cardiomyocytes of a patient with heart disease, comprising:

(a) providing heterokaryotic cardiomyocytes capable of developing desmosomes and gap junctions; and

(b) administering the heterokaryotic cardiomyocytes of step (a) through a catheter pathway.

17. A method as described in claim 16, wherein the cardiomyocytes of step (a) are prepared by the additional step of controlled cell fusion in vitro between myocytes and cardiomyocytes.

18. A method as described in claim 16, wherein the controlled cell fusion step comprises the addition of chondroitin sulfate.

19. A method as described in claim 16, wherein the chondroitin sulfate is added to a final concentration of between 5 micromolar to 5 millimolar.

20. A composition of cells useful for repair of damaged heart muscle, comprising heterokaryons that exhibit characteristics of both normal myoblasts and normal cardiomyocytes, including the ability to undergo mitosis in vitro and to develop desmosomes, gap junctions, and to contract in synchrony after transplantation into damaged heart muscle.

21. A composition as described in claim 20, further comprising between 5 micromolar to 5 millimolar chondroitin sulfate.

22. A composition of cells useful for repair of damaged heart muscle, comprising heterokaryons that exhibit characteristics of both normal myoblasts and normal cardiomyocytes, including the ability to undergo mitosis in vitro.

23. A composition as described in claim 20, wherein the heterokayons transgenically express a cellular integration factor selected from the group consisting of an angiogenesis factor, TGF-beta, vascular endothelial growth factor, fibroblast growth factor, platelet derived growth factor, angiogenin, pleiotrophin, and interleukin-8.

24. A composition as described in claim 20, further comprising a cellular integration factor selected from the group consisting of a migration factor, a scaffolding protein, PDGF, HGF, fibronectin, MMP-1, MMP-2, laminin, laminin-1, fibronectin, type I collagen, type II collagen, type IV collagen, thrombospondin-I,

lecithin-oxytetracycline-collagen matrix, a galactin, galectin-1, vitronectin, and von Willebrand protein.

25. A composition of cells useful for repair of damaged heart muscle, comprising myoblasts that have been transgenically transformed to express a cellular integration factor selected from the group consisting of an angiogenesis factor, vascular endothelial growth factor, fibroblast growth factor, TGF-beta, platelet derived growth factor, angiogenin, pleiotrophin, and interleukin-8.

26. A composition as described in claim 25, further comprising a cellular integration factor selected from the group consisting of a migration factor, a scaffolding protein, PDGF, HGF, fibronectin, MMP-1, MMP-2, laminin, laminin-1, fibronectin, type I collagen, type II collagen, type IV collagen, thrombospondin-I, lecithin-oxytetracycline-collagen matrix, a galactin, galectin-1, vitronectin, and von Willebrand protein.

27. A composition of cells useful for repair of damaged heart muscle, comprising myoblasts and an effective amount of a cellular integration factor selected from the group consisting of an angiogenesis factor, vascular endothelial growth factor, fibroblast growth factor, platelet derived growth factor, angiogenin, TGF-beta, pleiotrophin, and interleukin-8a migration factor, a scaffolding protein, PDGF, HGF, fibronectin, MMP-1, MMP-2, laminin, laminin-1, fibronectin, type I collagen, type II collagen, type IV collagen, thrombospondin-I, lecithin-oxytetracycline-collagen matrix, a galactin, galectin-1, vitronectin, and von Willebrand protein.